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Claims

[c1] 1. A zirconia sol, comprising:
zirconia crystals having an average primary particles size less than 20 nm, wherein more than 90% of thezirconia crystals exist in the form of tetragonal and cubic crystal lattice structures, and the zirconia sol has a transmittance more than 70% when the amount of the zirconia crystals in the zirconia sol is about 20 wt%.

[c2] 2.The zirconia sol according to claim 1, wherein the zirconia sol has a transmittance more than 90% when the amount of the zirconia crystals in the zirconia sol is about 10 wt%.

[c3] 3.The zirconia sol according to claim 1, wherein the average primary particles size of the zirconia crystals is between 7~20 nm.

[c4] 4.The zirconia sol according to claim 1, wherein the zirconia sol has a pH value between 5~10.

[c5] 5. A method of preparing a zirconia sol, comprising:
providing a first solution containing an inorganic zirconium salt and an organic acid therein;
mixing the first solution with a buffer solution contain-

ing an organic amine therein for obtaining a sol;
heating the sol to obtain a product;
conditioning the product to form a acid mud; and
conditioning the acid mud to form a neutral zirconia sol.

[c6] 6.The method according to claim 5, wherein after the step of mixing the first solution with the buffer solution, further comprising regulating the pH value of the sol between 10 ~12.

[c7] 7.The method according to claim 5, wherein during the step of mixing the first solution with the buffer solution, further comprising a step of adding an inorganic base into the buffer solution.

[c8] 8.The method according to claim 7, wherein when mixing the first solution with the buffer solution and adding the inorganic base into the buffer solution, further comprising controlling the variation of the pH value of the buffer solution not exceeding a variation range of ±0.5.

[c9] 9.The method according to claim 8, wherein the step of controlling the pH value of the buffer solution comprises controlling the dosing speeds of the first solution and the inorganic base into the buffer solution.

[c10] 10.The method according to claim 5, wherein when mixing the first solution with the buffer solution, further

comprising controlling the temperature variation of the buffer solution not exceeding a variation range of ±10°C.

[c11] 11.The method according to claim 5, wherein an amount of the inorganic zirconium salt in the first solution is between 2~4 mol/L.

[c12] 12.The method according to claim 5, wherein the inorganic zirconium salt in the first solution is selected from one of zirconium chloride, zirconium nitride and zirconium hypochloride.

[c13] 13.The method according to claim 5, wherein the organic acid and the zirconium ions in the first solution have a molar ratio between 0.1~0.25.

[c14] 14.The method according to claim 5, wherein the organic acid is selected from one of formic acid, acetic acid, propionic acid, acrylic acid, methacrylic acid, benzoic acid, salicylic acid, tartaric acid and citric acid.

[c15] 15.The method according to claim 5, the buffer solution contains ammonium carbonate.

[c16] 16.The method according to claim 5, wherein the organic amine in the buffer solution is selected from one of trimethylamine, triethylamine, triethanolamineand tripropoylamine.

[c17] 17.The method according to claim 5, wherein the organic amine in the buffer solution and the zirconium ions in the first solution have a molar ratio between 0.1~0.2.

[c18] 18.The method according to claim 5, wherein the step of heating the sol is conducted under 90~120℃.

[c19] 19.The method according to claim 5, wherein the step of heating the sol is conducted for a duration of about 8~24 hours.

[c20] 20.The method according to claim 5, wherein the product obtained after heating the sol comprises zirconia crystals having an average primary particles size less than 20 nm.

[c21] 21.The method according to claim 20, wherein the zirconia crystals have an average primary particles size between 7~20 nm.

[c22] 22.The method according to claim 20, wherein the zirconia crystals exist in combined tetragonal and cubic crystal lattice structures.

[c23] 23.The method according to claim 5, wherein after the step of heating the sol, further comprising the steps of washing and filtering the product.

[c24] 24.The method according to claim 5, wherein an organic acid and an organic dispersing agent is used in the step of conditioning the product to form the acid mud.

[c25] 25.The method according to claim 24, wherein an amount of the organic dispersing agent in the zirconia sol is 10%~ 15 wt% based on the solid weight.

[c26] 26.The method according to claim 24, wherein the acid mud has a pH value less than 3.

[c27] 27.The method according to claim 5, wherein the neutral zirconia sol has a pH value between 5~10.

[c28] 28.The method according to claim 5, wherein after the step of conditioning the acid mud to form the neutral zirconia sol, further comprising a step of drying the neutral zirconia sol to form a powder.

[c29] 29.The method according to claim 28, wherein vacuum concentrating or vaporizing method is performed for accomplishing the step of drying the neutral zirconia sol.

[c30] 30.The method according to claim 28, wherein after the step of drying the neutra zirconia sol to form the powder, further comprising a step of dispersing the powder into a solvent to obtain a transparent dispersion sol.

[c31] 31.The method according to claim 30, wherein the solvent is selected from one of water, a polar solvent and a mixed solvent thereof.

[c32] 32.The method according to claim 31, wherein the polar solvent comprises ethanol or ethylene glycol.